

Abstract

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Study of Corrosion Behavior for Welded Area of Stressed Austenitic Stainless Steel

The corrosion behavior of austenitic steel was investigated under both static and dynamic conditions. In this study, corrosion behavior of welded and unwelded austenitic stainless steels, SS304, SS310, SS316 were investigated using three different stirring speeds, 100, 200, 350 rpm and were subjected to two different corrosive environments seawater (3.5% NaCl) and acidic ferric chloride (FeCl₃). The rate of corrosion was measured using spectrophotometry. The microstructure was examined using optical microscopy. Experimental results indicated that the highest corrosion rate was observed in acidic ferric chloride, 8.56 mg/(min*cm²) for SS304 at 350 rpm speed (high mechanical stress condition), compared to sea water under the same conditions, 7.96 x 10⁻⁴ mg/(min*cm²). Welded stainless steel area was highly sensitive to the corrosive environment as a result of increasing the thermal stresses in both the weld zone and the heat affected zone (HAZ). Also, the corrosion rate was found to increase with increasing the stirring speed due to its effect on the mass transfer and mechanical and thermal stresses